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sulphate of soda, coloured with syrup of violets, and inverted in a cup containing the same liquid. A similar wire in another tube, also filled with the coloured solution, was placed in communication with the earth, and the fluids in each made to communicate by a bent glass tube passing from one cup to the other. The result of the experiment was, that hydrogen gas and alkali were developed in the first tube, and oxygen gas and acid in the latter.

The reading of a Paper, entitled, "An Account of Operations carried on for ascertaining the Difference of Level between the River Thames at London Bridge and the Sea: and also for determining the Height above the Level of the Sea, &c. of intermediate points passed over between Sheerness and London Bridge." By John Augustus Lloyd, Esq. F.R.S.;—was commenced.

March 3.

HIS ROYAL HIGHNESS THE DUKE OF SUSSEX,
President, in the Chair.

The Rev. Robert Walker, M.A. was elected a Fellow of the Society.

The following Presents were received, and thanks ordered for them :—

Illustrations of Indian Zoology. Part V. Folio.—*Presented by John E. Gray, Esq.*

Illustrations of Mr. Cooper's Surgical Dictionary. Parts IV., V., and VI. 8vo.—*W. P. Cocks, Esq.*

Notice of the Proceedings of the Geological Society. No. 18. 8vo.—*The Society.*

The Philosophical Magazine and Annals of Philosophy. No. 51. 8vo.—*The Editors.*

The Christian's Magazine, or Weekly Miscellany of Religious Essays, Anecdotes, Literature, Biography, Intelligence, and Poetry. No. 1. 8vo.—*The Editor.*

National Portrait Gallery. No. 23. 8vo.—*The Proprietors.*

A Vade Mecum of Morbid Anatomy, Medical and Chirurgical; with Pathological Observations and Symptoms. Illustrated by upwards of Two Hundred and Fifty Drawings. By W. Money. Second Edition. 8vo.—*The Author.*

The reading of Mr. Lloyd's Paper was resumed and concluded.

The author of this paper received directions from the Lords Commissioners of the Admiralty, in February 1830, at the suggestion of the Royal Society, to survey the river Thames, with a view of ascertaining the difference of level between certain parts of it and the mean level of the sea near Sheerness. Having had experience, while employed in a survey of the Isthmus of Darien, of the great

imperfections in the levelling instruments hitherto used, he bestowed great pains in improving the construction of those employed in the present survey; endeavouring to combine the properties of great steadiness and accuracy of motions in azimuth, with increased delicacy in the level, and permanence in the general position of the whole apparatus; and also to increase the power of the telescope. The author then enters into a full description of the improved instruments which he employed, accompanied by drawings.

As soon as he was furnished with the proper means of observing, he commenced his operations at Sheerness in the month of March. The principal object of his commission being to ascertain the heights of different places above the level of the sea, it became necessary, in the first place, to estimate the heights of the tide; and accordingly, having obtained permission from the Admiralty to erect a tide gauge at the Dock Yard at Sheerness, he selected a corner of the boat basin as the most eligible spot for this purpose: having accomplished this object, he next directed his attention to the establishment of a standard mark, from whence, as from a zero point, the levellings might be reckoned. Considerable difficulty was met with in fixing upon a spot in every respect adapted to this object; for all the buildings in the immediate vicinity of the tide gauge appeared to be deficient in the security of their foundation. He at length selected a large block of granite in the southern pier of the entrance to the boat basin. He then caused a block of gun metal, cast for the purpose, two inches and a half square and eight inches long, to be sunk in the centre of the granite, about an inch below the surface, thereby allowing a brass box and cover to be placed over the standard to protect it from injury. In order that there might be a sufficient number of checks to the permanence of this standard mark, the author caused others to be placed in the yard; namely, one near the southern extremity on the wall of the Dock Yard, one at the eastern side of the great basin, and one in a large block of stone resting on the brick-work of the navy wall. As a further means of future verification of this standard level, he had a very large block of granite placed on a slight eminence, two miles and a half to the southward of the Dock Yard, on which there formerly stood the old castle of Queenborough. One of the brass standards being let into the granite, the place was covered over, but marked by a small mound of earth near it, so that it may easily be referred to whenever it may be thought requisite.

From a series of observations made at Sheerness in the years 1827, 1828, and 1829, it is found that the mean high-water spring tides was 26·355 feet, low-water spring tides 8·74; mean 17·649. The mean high-water neap tides 22·656, low-water 11·336; mean 16·993. The mean of the whole period being 17·27.

The author then states the results of the successive levellings he took from Sheerness along the course of the river to London Bridge. On his arrival at Greenwich Hospital, he commenced a set of branch levels from thence to the Royal Observatory, for the purpose of determining its height above the level of the sea, — an operation which

was rendered tedious by the abruptness of the ascent. Having completed these observations, it occurred to the Astronomer Royal that the instruments employed in the survey might be used as a means of verifying the correctness of the horizontal point of the mural circles. The coincidence of the horizontal wires of the two instruments was found to be so nearly perfect, as to agree within a few hundredths of a second. From Greenwich the levelling was continued on the opposite side of the river to different places where tide-registers had been kept. By the kindness of Mr. Lubbock, the author was furnished with the results of twenty-six years' observations on the tides at the London Docks; from which it appears, that the height of mean high-water mark there, above that at Sheerness, is 2·24 feet and the height of spring tide high-water mark 2·03, and of neap tides 2·35. The Trinity mark on the western side of Old London Bridge is 2·16 feet below the north standard mark at Sheerness, and 1·9 foot above the mean spring tide high-water mark at Sheerness.

The author concludes by giving a long catalogue of standard marks and other points of reference between Sheerness and London Bridge, the north standard at Sheerness being taken as the zero point.

In the course of his observations he found reason to believe that the tremulous appearance of the air which has been termed *mirage*, is caused, not so much by evaporation as by the direct effect of the solar rays: for he remarked, that when there was a succession of clouds passing over the sun, the tremor was very great at those times when the sun shone; but the moment the sun was obscured over the whole space between the instrument and the object viewed, the air was perfectly tranquil.

March 10.

HIS ROYAL HIGHNESS THE DUKE OF SUSSEX,

President, in the Chair.

Alexander Caldcleugh, Esq. and John Carnac Morris, Esq. were elected Fellows of the Society.

The following Presents were received, and thanks ordered for them:—

An Engraved Portrait of Davies Gilbert, Esq. V.P.R.S. Engraved by Cousins from a painting by Howard.—*Presented by John Guilemard, Esq. F.R.S.*

Notices of the Proceedings of the Zoological Society. (Jan. 25 to Feb. 8, 1831.) 8vo.—*The Society.*

It being stated to the Meeting by the President that Mr. Caldcleugh, elected that evening, was on the point of leaving England for Mexico, and would consequently have no other opportunity during this session of attending for admission, Mr. Caldcleugh was allowed to sign the Obligation in the Charter Book, and was admitted a Fellow of the Society.